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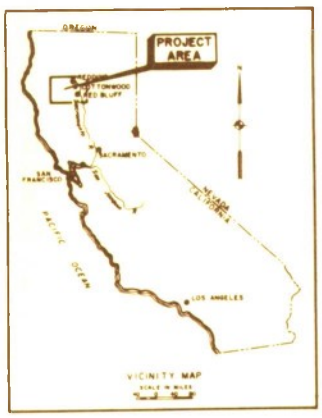
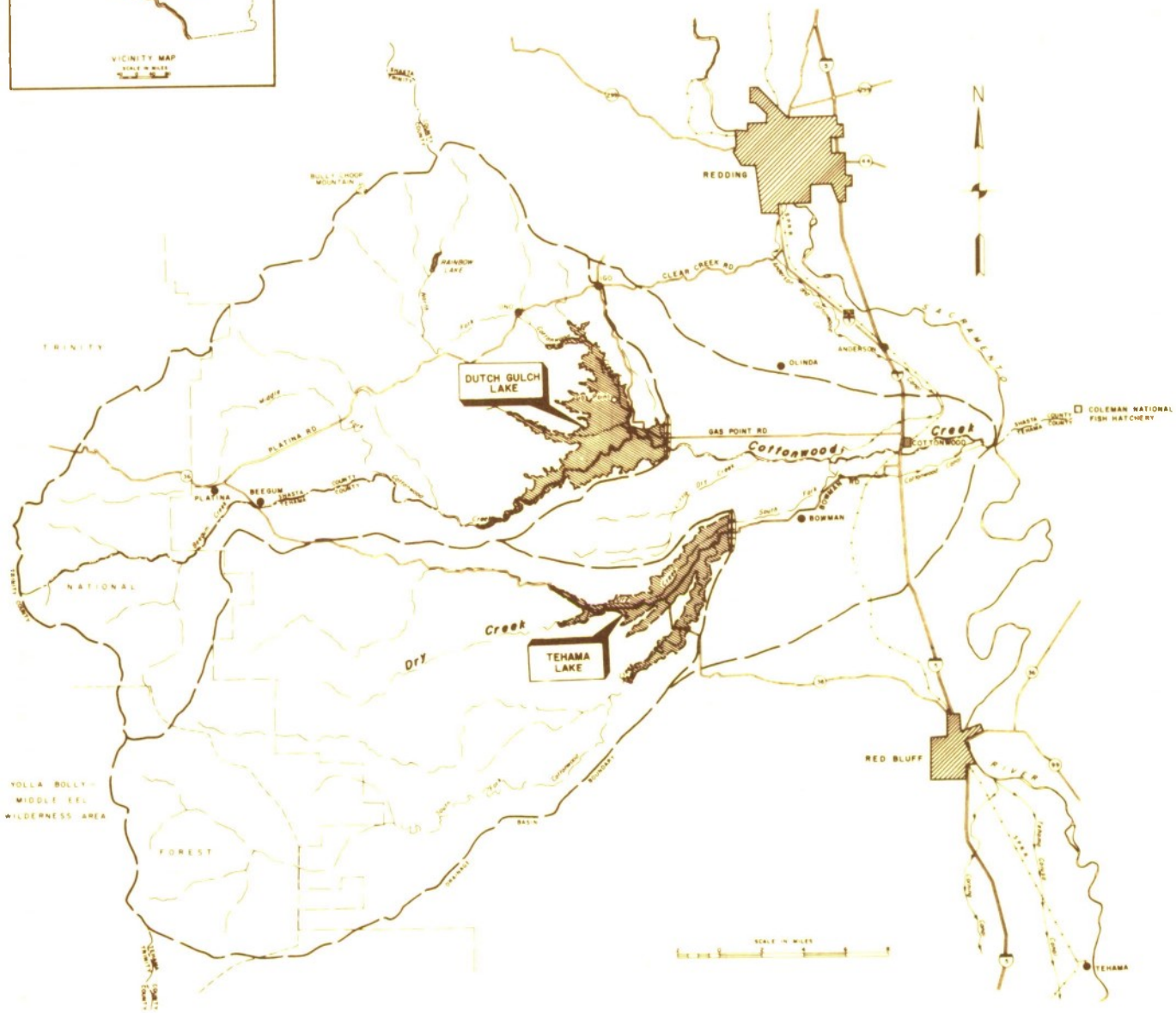
JUNE 1982

COTTONWOOD CREEK, CALIFORNIA

INFORMATION BROCHURE ON SELECTED PROJECT PLAN

DEPARTMENT OF THE ARMY
SACRAMENTO DISTRICT, CORPS OF ENGINEERS
SACRAMENTO, CALIFORNIA





LEGEND

- Road — Interstate Highway; State Highway
- Railroad
- County boundary
- National forest boundary
- Drainage basin boundary
- Canal
- Authorized reservoir
- Yolla Bolly - Middle Eel Wilderness Area

AUTHORIZED
COTTONWOOD CREEK PROJECT
GENERAL MAP

DEFENSE TECHNICAL INFORMATION CENTER

Information for the Defense Community

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COTTONWOOD CREEK, CALIFORNIA INFORMATION BROCHURE ON SELECTED PROJECT PLAN

JUNE 1982

INTRODUCTION

The Cottonwood Creek, California, project was authorized for construction by Congress in the Flood Control Act of 1970 for flood control, water supply, recreation, and anadromous fishery enhancement. As authorized, the project provides for construction of two multiple-purpose reservoirs, Dutch Gulch Lake to be located on the main stem Cottonwood Creek and Tehama Lake to be located on South Fork Cottonwood Creek.

Feasibility studies of water resource problems and needs were conducted in the late 1960's and culminated in a report to Congress and subsequent authorization of the project. In October 1976, the Corps initiated advanced engineering and design studies leading to project construction. The first portion of these studies (Phase I) is preconstruction planning. The planning is being conducted in view of current and projected needs and conditions to insure that the most appropriate project is constructed. Studies are essentially completed, and a draft of a Phase I General Design Memorandum (GDM) and Environmental Impact Statement (EIS) describing the project have been prepared and are available for review. The main report contains both the GDM and EIS, bound in 1 volume, and there are 13 appendixes bound in 3 volumes. The appendixes include information to support the main report.

This brochure summarizes the Phase I studies and includes a description of the study area and its water resources and related problems and needs, alternative plans considered, the project selected for implementation, study conclusions, and the schedule of future activities.

Copies of the project documents are available for review at the following locations:

Shasta County Library
Anderson Branch
3200 West Center
Anderson, California

Shasta County Library
Redding Branch
1855 Shasta Street
Redding, California

Shasta County Department of Water Resources
1855 Placer Street
Redding, California

Tehama County Library
909 Jefferson Street
Red Bluff, California

Tehama County Public Works Department
Gerber, California

California State University, Chico
North-East California Library
Chico, California

California State Resources Agency Library
The Resources Building
1416 Ninth Street
Sacramento, California 95814

Sacramento District
Corps of Engineers
650 Capitol Mall, Room 5570
Sacramento, California 95814

Should you desire to purchase a copy of the report or want additional information, please write:

District Engineer
U.S. Army Engineer District, Sacramento
ATTN: SPKED-W (Inv Sec C)
650 Capitol Mall
Sacramento, California 95814

or telephone Mr. Merritt Rice at (916) 440-3557.

PROJECT OBJECTIVES

STUDY AREA

The study area, as shown on Plate 1, includes the Cottonwood Creek basin, the Sacramento River flood plain downstream from Cottonwood Creek, the Sacramento-San Joaquin Delta, and Suisun Marsh. Also shown are municipal and industrial (M&I) water supply service areas of the State Water Project.

Cottonwood Creek basin is a 690-square-mile area in Northern California. Cottonwood Creek flows eastward through Shasta and Tehama Counties and joins the Sacramento River near the small town of Cottonwood, approximately midway between Redding and Red Bluff. On the average, yearly runoff of the creek is about 500,000 acre-feet. The flood plain along Sacramento River and in Butte and Colusa basins covers an area of over 500,000 acres and extends from Cottonwood Creek downstream to about 20 miles upstream from Sacramento. Butte and Colusa basins are natural depressions adjacent to the river. The Sacramento-San Joaquin Delta is a 700,000-acre expanse of low-lying islands and river channels at the confluence of the Sacramento and San Joaquin Rivers. Most of the water from these rivers flows through the Delta to reach San Francisco Bay and the Pacific Ocean. Suisun Marsh, located in southern Solano County between the Delta and San Francisco Bay, encompasses approximately 55,000 acres of wetland surrounding Grizzly and Suisun Bays. The State Water Project service areas which would receive water from the Cottonwood Creek project include most of eight counties in Southern California, portions of four counties in the San Francisco Bay area, two counties along the Central Coastline, and two counties in the southern San Joaquin Valley.

PROBLEMS AND NEEDS

Many potential water resources and related problems and needs were identified; however, flooding, water supply, fish and wildlife resources, hydropower, and recreation are the primary ones considered in the Phase I GDM.

Flooding

Flooding in Cottonwood Creek is estimated to cause $770,000 (1981 price levels) in average annual equivalent damages, primarily to agricultural developments along the lower portion of the creek. Along Sacramento River downstream from Cottonwood Creek and in the Butte and Colusa basins, the average annual equivalent flood damages are estimated at $23 million. In these areas, damages are primarily to agriculture, but urban damages have occurred in Red Bluff and other smaller communities. Sustained high flows, even without overtopping riverbanks, have caused erosion and subsequent deposition of sediments on downstream farmlands. In addition, seepage through levees has been a problem to adjacent farmlands.

Water Supply

The California Department of Water Resources expects the statewide demand for water to grow from about 33.8 million acre-feet in 1980 to about 37.6 million acre-feet by the year 2000. A substantial part of the demand in the future will be in urban areas which could be served by the State Water Project if sufficient water were available. The State has contracted with water districts

in the service areas to ultimately provide 4.2 million acre-feet of firm water supplies. The present system can provide only about 2.3 million acre-feet; however, the Department of Water Resources estimates that water demands will exceed the available supply by the mid-1980's and that the shortage will grow to about 1.7 million acre-feet by the year 2000.

The combined available ground-water and surface-water supplies in Cottonwood Creek basin are not adequate to bring all remaining available lands to full production. An estimated 14,000 acre-feet per year of supplemental water is needed to accomplish this.

Fish and Wildlife

California's increasing population, expanding industrial activities, and intensifying agricultural base are severely straining the dwindling fish and wildlife resources. The Whiskeytown blacktail deer herd in Western Shasta County is currently estimated by the California Department of Fish and Game at 65 percent of its size in the early 1960's. The number of anadromous fish spawning in Cottonwood Creek changes dramatically from year to year due at least in part to streamflows which are extremely variable. The Sacramento River salmon and steelhead fishery is only a fraction of its historic level. The valuable and once extensive riparian hardwood forests of the Sacramento Valley flood plain have been reduced significantly over the years.

Hydroelectric Power

Even though serious attempts are being made to conserve energy, California remains heavily dependent on fossil fuels. In addition, California's electrical needs are expected to double by the year 2000. Consequently, development of alternative sources of energy, particularly renewable sources like hydropower, is needed.

Recreation

Northern California, with its extensive forests and water resources, is well-known for outstanding recreational opportunities. Nearby Shasta, Whiskeytown, and Claire Engle Lakes provide valuable recreation potential and all have comprehensive recreation development, although facilities are often full and people have been turned away. Added lake recreation potential would also be valuable, and added facilities are needed in the region for fishing, water skiing, sailing, camping, and other activities.

Other

Several other problems and needs identified in the study area include occasional poor water quality in Cottonwood Creek, reportedly due to seepage from septic tanks near the community of Cottonwood; suspected ground-water overdrafting in the Cottonwood Creek basin between the authorized damsites and several miles west of Cottonwood; and high unemployment, averaging 12-½ percent, in 1980, in Shasta and Tehama Counties.

OBJECTIVES

The problems and needs of the study area were translated into specific objectives to guide in selection of a plan. They include:

- Supplying M&I water to the State Water Project for transfer to water-deficient urban areas of the State.

- Reducing flood damages along Cottonwood Creek, Sacramento River, and in Butte and Colusa basins; bank erosion, sedimentation, and seepage along Sacramento River; groundwater overdraft in Cottonwood Creek basin; and California's dependence on scarce fossil fuel for generation of electricity.

- Increasing water supplies in Cottonwood Creek basin, outdoor recreation opportunities in the Redding-Red Bluff area, and employment opportunities in the Shasta-Tehama County area.

- Preserving and enhancing fish and wildlife resources in Cottonwood Creek and Sacramento River and cultural and paleontological resources in Cottonwood Creek basin.

- Maintaining or improving water quality in Cottonwood Creek and Sacramento River.

ALTERNATIVE PLANS CONSIDERED

The authorized project would satisfy most of the identified problems and needs. However, to insure that a better project is not overlooked, a broad array of possible management measures were identified. On the basis of the preliminary assessment of which measures would meet the planning objectives, three action plans (Plate 2) and a no-action plan were selected for further consideration. Although not satisfying the planning objectives, the "no-action" plan was considered for comparison with accomplishments of the action plans.

- **Two-Reservoir Plan**

  The two-reservoir plan would be similar to the authorized project plan, which provides for multiple-purpose reservoirs at the Dutch Gulch and Tehama sites. The plan would provide flood control, water supply, recreation, power, and fish enhancement.

- **Three- or Four-Reservoir Plan**

  This plan has three variations—one providing for multiple-purpose reservoirs at the Dutch Gulch, Tehama, and Fiddlers sites and the second providing reservoirs at the Dutch Gulch, Tehama, and Dippingvat sites. In the third variation, four reservoirs would be constructed at the Dutch Gulch, Tehama, Fiddlers, and Dippingvat sites. Each plan variation could provide flood control, water supply, power, recreation, and fish enhancement.

- **Headwater Reservoir Plan — (partial nonstructural plan)**

  This plan includes multiple-purpose reservoirs at the Hulen, Dippingvat, and Fiddlers sites and a comprehensive program of nonstructural flood damage reduction measures downstream. The plan could provide flood control, water supply, power, recreation, and fish enhancement.

- **No-Action Plan**

  Under a no-action situation, existing programs would continue; projects currently under construction would be more assured of implementation and operation, but no new Federal actions would be taken to solve the water resource problems of the study area.

Of the three action plans, the authorized project plan with modifications was chosen for further formulation primarily because of the following features:

Highest net economic benefits of plans considered.

High probability of meeting the planning objectives.

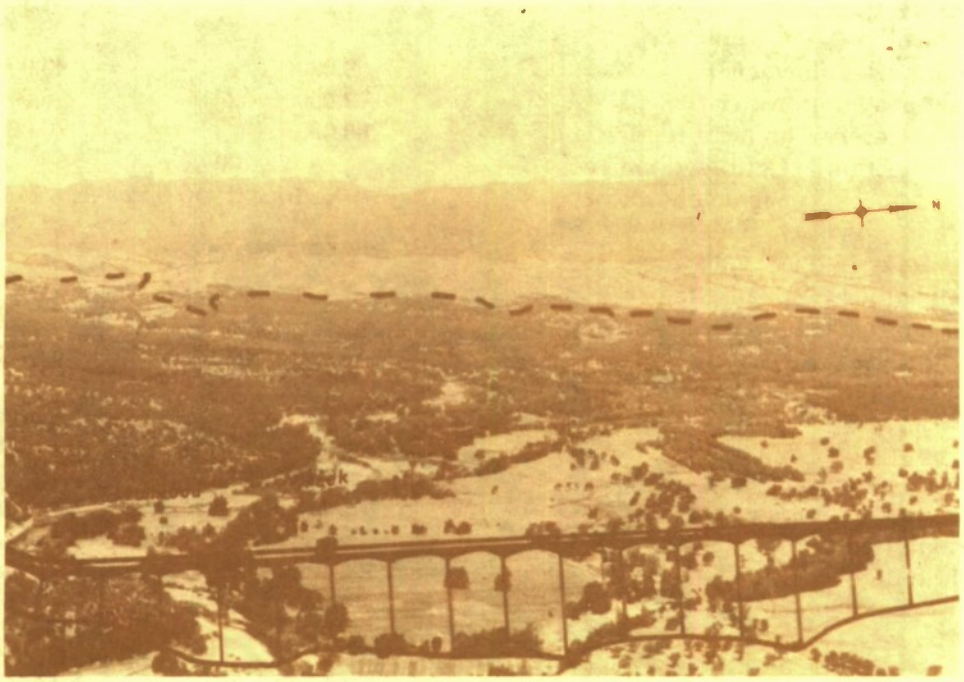
High potential to develop hydropower resources in Cottonwood Creek basin.

High potential for acceptance by interested entities.

SELECTED PROJECT

PROJECT FEATURES

Pertinent features of the selected project are shown on the following page. Dutch Gulch Lake would have capacity to store 900,000 acre-feet and Tehama Lake 700,000 acre-feet. However, the average annual storage in the reservoirs would be about 600,000 acre-feet at Dutch Gulch and 470,000 acre-feet at Tehama. On rare occasions, such as during a severe drought, the reservoirs could be drawn down to as low as 30,900 acre-feet at Dutch Gulch and 29,000 acre-feet at Tehama. Water levels in both lakes would fluctuate throughout the year and from one year to the next. The average annual fluctuation would be about 20 feet at Dutch Gulch and 13 feet at Tehama.

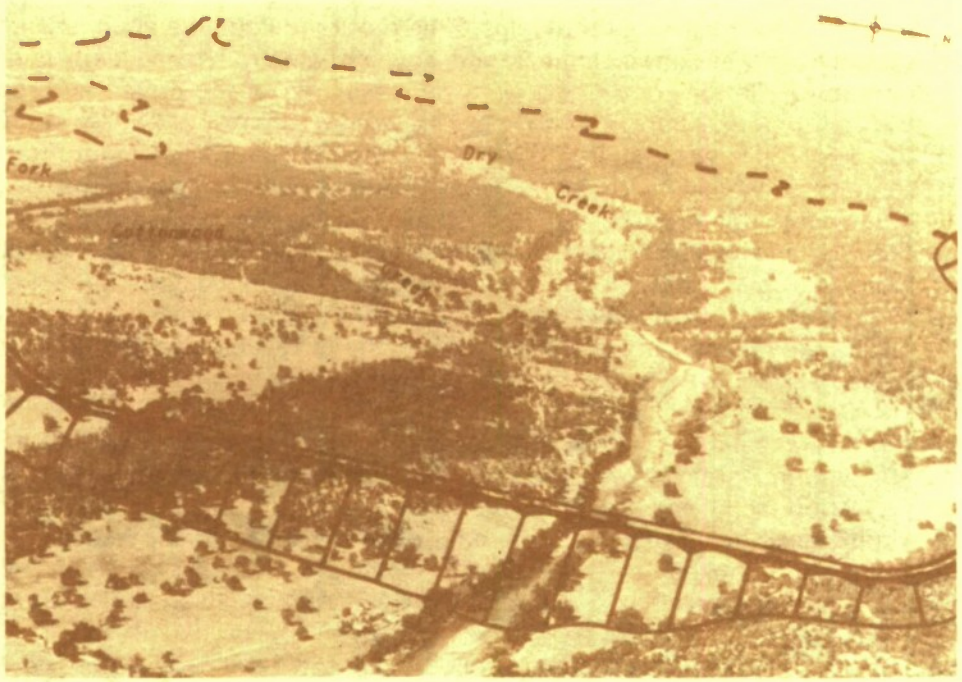


General location of Dutch Gulch Dam site in foreground with approximate limits of reservoir inundation at gross pool in background (dotted line) — looking west.

PERTINENT DATA

ITEM	DUTCH GULCH	TEHAMA
General		
Drainage areas (square miles)	394	371
Mean annual runoff (acre-feet)	299,700	193,400
Reservoir data		
Gross Pool		
capacity (acre-feet)	900,000	700,000
elevation (feet msl[1])	740	696
surface area (acres)	11,200	10,200
maximum depth (feet)	226	196
Average Pool		
capacity (acre-feet)	585,300	465,600
elevation (feet msl)	708	670
surface area (acres)	8,500	7,800
Inactive Pool		
capacity (acre-feet)	30,900	29,100
elevation (feet msl)	584	564
surface area (acres)	1,200	1,300
Flood control		
100-year peak inflow (cfs[2])	59,000	40,000
100-year peak outflow (cfs)	10,000	6,000
maximum reservation (acre-feet)	200,000	170,000
flood protection: Cottonwood Creek	100-year	
Sacramento River	Reduce flood damages	
M&I water supply		
critical dry period yield (acre-feet/year)	205,000	
average annual yield (acre-feet/year)	180,000	
Recreation use at minimum facilities		
(user days/year)	52,500 (1990)	63,000 (2090)
Dam		
Type	Rolled earthfill with impervious core	
Top-of-dam elevation (feet msl)	758.6	714
Height above streambed (feet)	247	215
Crest length (feet)	20,700	23,040
Crest width (feet)	30	30
Spillway		
Type	Ungated low ogee	
Crest elevation (feet msl)	740	696
Crest length (feet)	800	800
Discharge capacity at maximum pool (cfs)	136,000	129,500
Elevation at design flow (feet msl)	754.4	710.2
Outlet works		
Number	1	1
Entrance invert elevation (feet msl)	520.5	504
Design discharge of flood control intake		
(cfs)	10,000	6,000

[1]Mean sea level.
[2]Cubic feet per second.



General location of Tehama Dam site in foreground with approximate limits of reservoir inundation at gross pool in background (dotted line) — looking southwest.

Both dams would be earthfill structures with impervious clay cores, covered on both upstream and downstream faces by rock protection. Heights would be 247 feet at Dutch Gulch and 215 feet at Tehama, with lengths of 3.9 miles and 4.4 miles, respectively. Eight low spots on the ridge surrounding Tehama Lake would be raised by constructing dikes. The spillway at each reservoir would be ungated. At Dutch Gulch, the spillway would be located about 2 miles west of the right abutment to the dam and would drain into Moboy Gulch. At Tehama, the spillway would be located near the right abutment to the dam and would discharge into Mitchell Gulch.

Flows in Cottonwood Creek downstream from the dams would average about 1,100 cubic feet per second (cfs) in June, July, and August, whereas flows now average about 150 cfs during these months. In the winter, flows would fluctuate from a low of about 100 cfs to as much as 15,000 cfs (due primarily to operation for flood control). Today, these flows range from a low of about 100 cfs to more than the 70,000 cfs which occurred in the 1974 flood. Releases normally would be made through circular conduits under the dams. Water entering each conduit would pass through two control gate openings which would be housed in the bottom of a concrete control tower at the upstream end of the outlet works. The control tower would extend above the water surface and be connected to the dam by an access bridge. The tower would include capabilities to make releases from various elevations for temperature control.

A fish hatchery tentatively sited for construction downstream from Dutch Gulch would not only enhance the anadromous fishery resource but would also help to provide mitigation for adverse impacts on this resource. Other measures to mitigate for adverse impacts on the downstream fishery would include reservoir releases specifically for the fish, temperature control inlet structures

previously referred to, fish trapping and transport facilities, and a fish habitat management program in Cottonwood Creek downstream from the dams. This program would be accomplished primarily on 2 miles of stream to be acquired immediately downstream from each dam and 2 miles of stream near the mouth of Cottonwood Creek. On the remainder of the creek the program would be accomplished through permission of landowners for access to improve habitat conditions when needed. To mitigate for adverse impacts on wildlife, a habitat improvement program would be accomplished on project lands and existing Federal and private lands in the basin through permission of landowners. This program would be similar to an existing program of the California Department of Forestry and would consist of burning overaged brush and adding water sources and selected plants to replace habitat for wildlife. In addition, mitigation for adverse impacts would include: (1) restocking wild turkeys to replace population; (2) replacing riparian habitat on project lands — fish management areas, spillways, peripheral reservoir lands, and borrow areas; and (3) preserving and salvaging cultural and paleontological resources.

Land requirements are estimated at 41,900 acres. This includes about 34,900 acres for the reservoirs and surrounding area in order to operate and maintain the project, 1,700 acres for possible future recreation facilities, 1,300 acres along Dry Creek for obtaining embankment materials, 600 acres within the 6 miles of stream channel downstream from the dams (2 miles downstream from each dam and 2 miles near the mouth of Cottonwood Creek), and 3,400 acres for new floodways downstream from each spillway along Moboy and Mitchell Gulches.

At each lake, minimum facilities to protect public health and safety will be provided for public access at the end of an existing road.

A layout of the selected project is shown in plate 3.

ACCOMPLISHMENTS

Flood Control

Dutch Gulch and Tehama would have a total of 370,000 acre-feet dedicated to flood control. This storage would control floodflows up to and including the 100-year event along lower Cottonwood Creek. As an example, the project would have reduced flows which occurred along lower Cottonwood Creek during the 1974 flood (estimated at a 20-year event) from 70,000 cfs to less than 15,000 cfs. Acting in conjunction with Shasta Lake, the project would also significantly reduce flood damages along Sacramento River. It would reduce floodflows caused by the 100-year event along the river to a magnitude that would be expected to occur about once in 50 years. In total, it is estimated that the project would virtually eliminate flooding along Cottonwood Creek and reduce flood damages along Sacramento River by about 30 percent. This would amount to an average annual equivalent reduction in total flood damages of about $7,940,000. This includes approximately $330,000 for reduction of flood proofing requirements that would be needed without the project.

Water Supply

An estimated 205,000 acre-feet per year during the most critically dry period of record would be provided to the State Water Project. This water would be used by the Department of Water Resources to help satisfy future demands in the State Water Project service areas. Based on the least-costly, most-likely alternative similar source for M&I water supplies, the estimated annual benefit attributable to the Cottonwood Creek project of this water supply would be $58.1 million. Although an authorized project purpose, no storage for irrigation water supply is presently included in the selected project, since Phase I studies indicated this would not be economically

feasible. Irrigation water supply is being treated as a deferred purpose so that if conditions change in the future, water can be provided without project reauthorization. Even though no specific storage for irrigation is included, it is estimated that about 3,000 acre-feet per year from the reservoirs would recharge the ground-water aquifer and be available for pumping and agricultural uses on lands downstream.

Fishery Enhancement

The anadromous fish hatchery sited for downstream from Dutch Gulch Lake would have a capacity for 15,000 adult salmon and 3,000 adult steelhead trout each year. The spawning fish would produce many times their numbers, resulting in benefits not only to inland sport fishing but also to both commercial and ocean sport fishing. The estimated average annual monetary benefit to the anadromous fish resources would be about $2.1 million. There is a potential significant reservoir fishery as well, but this would be limited to a modest program similar to recreation.

Recreation

Although recreation is an authorized project purpose and estimates show that a significant demand for recreation could be accommodated if recreation potential were developed, no recreation facilities are included in the selected project. This is because, during Phase I studies, no non-Federal sponsor agreed to provide one-half of the construction costs and administer, operate, and maintain the completed facilities as required. However, to protect public health and safety, minimum facilities would be provided at the end of an existing road at each reservoir and operated by the Corps. These facilities are estimated to accommodate approximately 52,500 recreation user days per year initially, increasing gradually to a maximum of 63,000. This relatively minor development would provide a small benefit estimated at an average annual value of approximately $81,000. Potential recreation use and benefits are estimated at 3 million recreation user days and $5.16 million average annually.

Employment

The project would provide jobs to workers who otherwise would be unemployed, initially through construction and later for operation and maintenance. It would also stimulate the economy of the Shasta-Tehama County areas through wages paid to the workers. The estimated number of workers needed for project construction from the local area would range from just a few in the first several years of construction to nearly 400 by the fifth year. The estimated average annual benefits attributable to employment and area development would be approximately $6.2 million.

Hydroelectric Power

Although hydroelectric power is not an authorized project purpose, so as not to preclude the possibility of generating hydropower in the future, and since investigations during the Phase I study process indicated power would probably be economically feasible, base facilities are included in the project design to allow future addition of generating equipment. Detailed hydropower studies are planned. It is estimated that the total generation capacity could be up to 9,000 kilowatts, with an average annual generation of about 30 million kilowatthours, which is equivalent to about 60,000 barrels of oil.

PROJECT ECONOMICS

On the basis of 1981 prices, the total estimated first cost for the selected project would be $694 million. The estimated average annual cost for the project using a 7-⅝ percent interest rate and a 100-year economic life including an estimated value for operation, maintenance, and replacement is $58.8 million. The economic viability of the project is measured by the ratio of average annual benefits to average annual costs. This ratio, which must be greater than unity to show more dollars returned from the $58.8 million project than spent on it, is estimated at 1.3 to 1 for the selected project. The following tabulation summarizes the estimated benefits and costs for the selected project.

Item	Amount
Average annual benefits:	
Flood control	7,940,000
M&I water supply	58,100,000
Recreation[1]	30,000
Anadromous fishery enhancement	2,110,000
Employment	6,170,000
Total	74,350,000
Total first cost	$694,000,000
Average annual cost, including operation, maintenance, and replacement	58,790,000
Net benefits (benefits minus costs)	15,560,000
Benefit-cost ratio	1.3 to 1

[1]Includes benefits for use at the project minimum facilities less use in the area without the project.

ADVERSE PROJECT IMPACTS

Construction of the two dams would block the upstream annual migration of an estimated 1,250 salmon and 1,000 steelhead trout. An estimated 2,700 salmon would continue to spawn below the damsites. The project would reduce winter floodflows, increase summer flows, change water quality (primarily temperature) in Cottonwood Creek and Sacramento River, and reduce gravel movement in Cottonwood Creek. At full pool, the lakes would inundate 21,400 acres of habitat currently estimated to support about 1,000 deer, about 200 turkeys, 48 species of mammals, 29 species of reptiles and amphibians, and 132 species of birds. About 1,500 acres of riparian habitat would be lost. The reservoirs would inundate cultural and paleontological sites. The project would remove an estimated 41,900 acres from the tax rolls and displace about 280 people currently residing within the area. Studies by the Department of Water Resources indicate that direct and indirect growth-inducing impacts would result from the increased water supplies in several of the State Water Project service areas.

Measures to mitigate for these primary impacts caused by the project have been included in the project plan, as discussed previously.

IMPLEMENTATION RESPONSIBILITIES AND COST SHARING

The Corps of Engineers would: (1) Design and construct the project; (2) with the exception of the fish hatchery, operate and maintain the completed project; (3) develop the flood control release schedule; (4) obtain rights-of-entry as needed to perform the downstream fish management measures; and (5) monitor postproject conditions. The U. S. Fish and Wildlife Service has agreed to administer the fish hatchery and has arranged for operation and maintenance by the Department of Fish and Game. The Department of Water Resources would: (1) provide the schedule for M&I water supply releases, (2) regulate use of the M&I water after it is released from the reservoirs, (3) accept liability on behalf of the Federal Government should damages result from construction or operation of the project for water supply, (4) obtain water rights from the California Water Resources Control Board for the project and adjust all claims regarding water rights that might be affected by the project, and (5) administer the wildlife mitigation program on Federal and private lands. The State Reclamation Board would insure that the flood-carrying capacities of Cottonwood Creek downstream from the reservoirs are maintained. In addition, if recreation facilities are included in the project in the future, an agreement with a non-Federal entity would be needed to pay for at least half of the separable cost for recreation lands and facilities and assume full responsibility for administration, operation, and maintenance of the facilities.

The cost allocated to M&I water supply would amount to about $627 million. The remainder of the project cost would be borne by the Federal government. The repayment of the State share of the costs would be over 50 years, as provided by the Water Supply Act of 1958, including charges allocated to interest, amortization, operation, maintenance, and replacement, and would amount to about $57 million per year. This is based on October 1981 price levels and a fiscal year 1982 discount rate for repayment which would be different at the time of construction.

VIEWS OF OTHERS

Close coordination with Federal, State, and local governmental agencies and interested individuals and organizations has been maintained throughout preconstruction planning studies. Public meetings on the project were held in Cottonwood on 29 March 1977 and 29 November 1978, and numerous additional meetings have been held with concerned individuals and organizations. From information obtained to date, the overwhelming majority of local residents and local officials favor the flood control and employment benefits the project could provide; a significant segment of the local residents want assurance that local water needs are met before water is released for the State Water Project; local residents as well as environmental groups and agencies desire that environmental quality, particularly the anadromous fishery, be protected; and local entities desire that a decision be made soon on construction of the project, to give relief to potentially affected property owners who can neither fully use nor dispose of their land while construction of the project is uncertain.

As in all projects of this magnitude, several issues exist. On the selected project, issues between the U.S. Fish and Wildlife Service, California Departments of Fish and Game and Water Resources, and the Corps include potential adverse impacts on wildlife, downstream riparian habitat, salmon fishery, and waterfowl in Butte basin as well as appropriate mitigation for those impacts. Significant coordination is being conducted between these agencies to resolve the issues.

CONCLUSIONS

- The need for construction of the Cottonwood Creek project is reaffirmed, essentially as authorized by the Congress.
- The project would virtually eliminate flood damages on Cottonwood Creek and would significantly reduce flood damages on the Sacramento River.
- The water supply yield from the project would help the California Department of Water Resources meet future municipal and industrial needs in the State Water Project service areas. Although provision of an irrigation water supply is not presently cost-effective, it is being retained as a deferred project purpose should future economic conditions change.
- Due to the high likelihood of hydropower being economically feasible, base facilities for future addition of generating equipment have been added to the project design.
- Recreation, although highly desirable, will be a deferred project purpose due to the lack of a non-Federal cost-sharing entity.
- Adequate mitigation can be achieved for all significant adverse impacts to fish, wildlife, cultural, paleontological, and related resources. In addition, the salmon and steelhead fishery can be enhanced.
- The project first cost is estimated to be $694 million (1981 price levels). The resulting average annual costs are $58.8 million and annual benefits are $73.6 million, yielding a benefit-cost ratio of about 1.3 to 1.

PROJECT SCHEDULE

The project schedule is as follows:

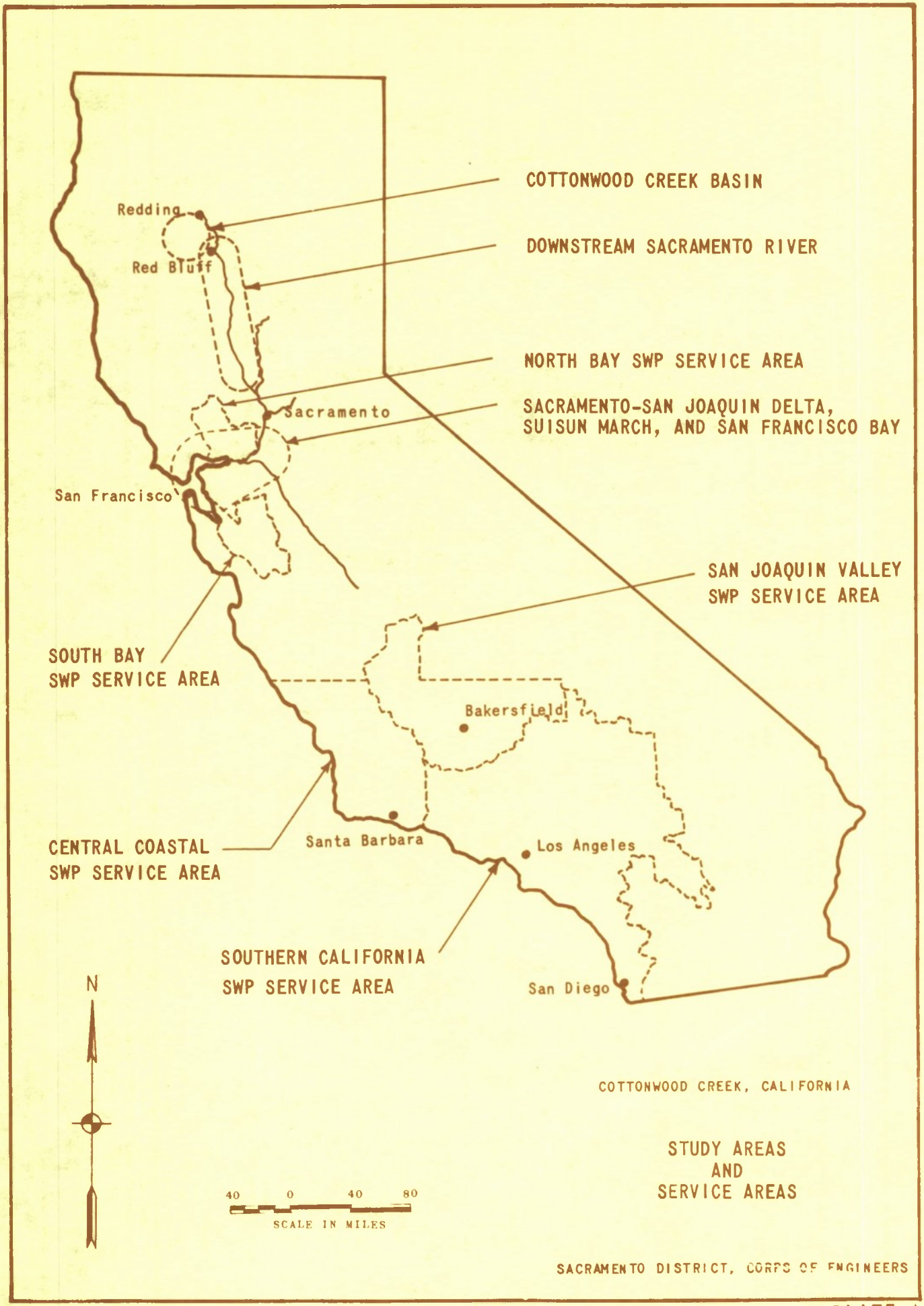
Complete GDM and EIS — October 1982
Prepare Plans and Specifications — 1982-87
Initiate Land Acquisition and Construction — 1984
Complete Construction — 1992

Accomplishment of this schedule depends on the timely completion of future detailed design studies and resolution of several outstanding issues and adequate funding by Congress for further activities.

COMMENT SHEET

We encourage you to send us your comments, opinions, or suggestions about the project. A special comment sheet is provided at the back of the brochure for your convenience. Also, we would appreciate your assistance in updating our project mailing list. Please check to see if your address is correct and add the names and addresses of others you think would be interested in the project who are not already receiving information.

SACRAMENTO DISTRICT
CORPS OF ENGINEERS

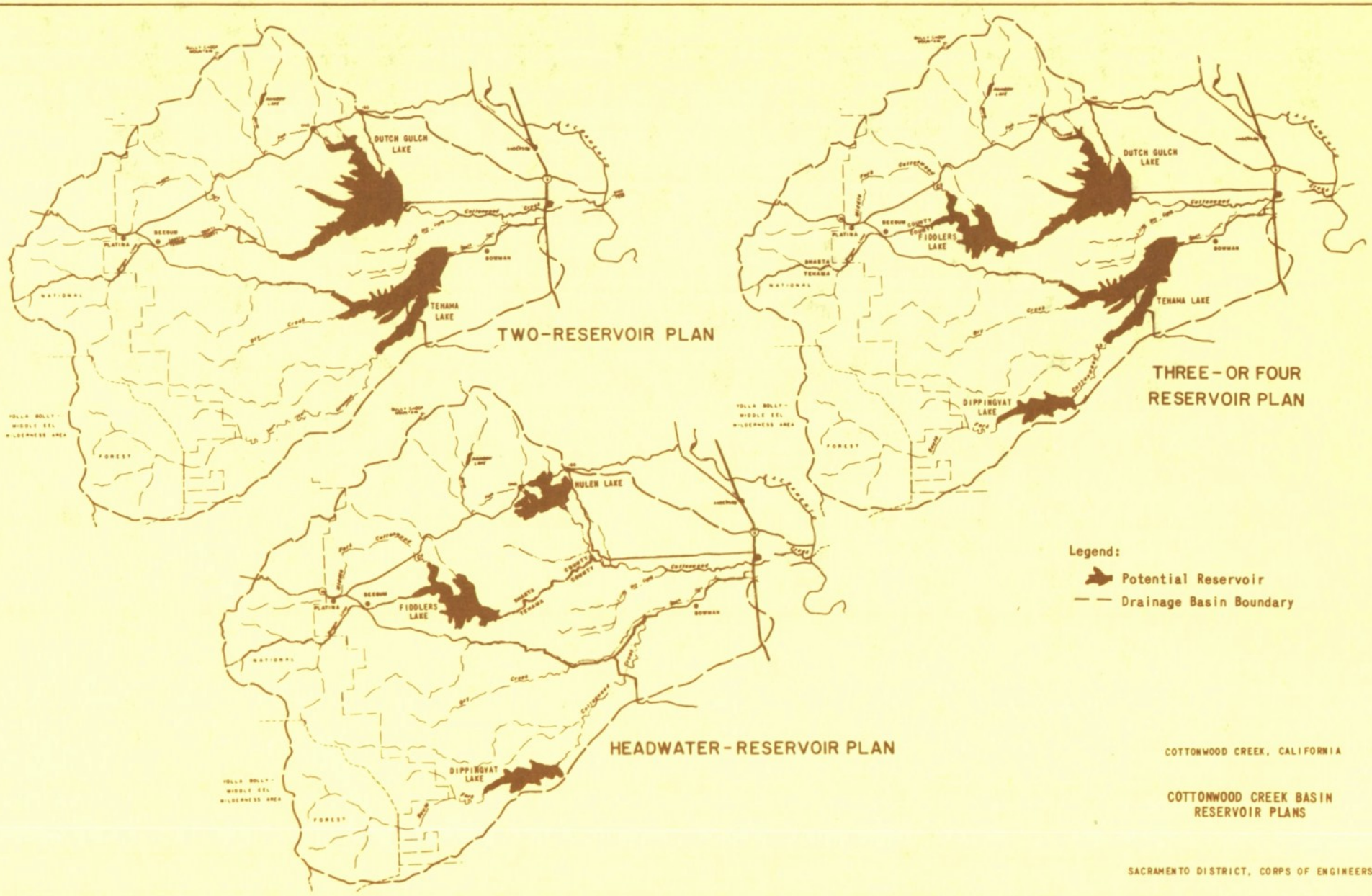


COTTONWOOD CREEK, CALIFORNIA

STUDY AREAS
AND
SERVICE AREAS

SACRAMENTO DISTRICT, CORPS OF ENGINEERS

PLATE 1



COTTONWOOD CREEK, CALIFORNIA

COTTONWOOD CREEK BASIN
RESERVOIR PLANS

SACRAMENTO DISTRICT, CORPS OF ENGINEERS

PLATE 2

FUNCTIONAL ANALYSIS - VE PAYS

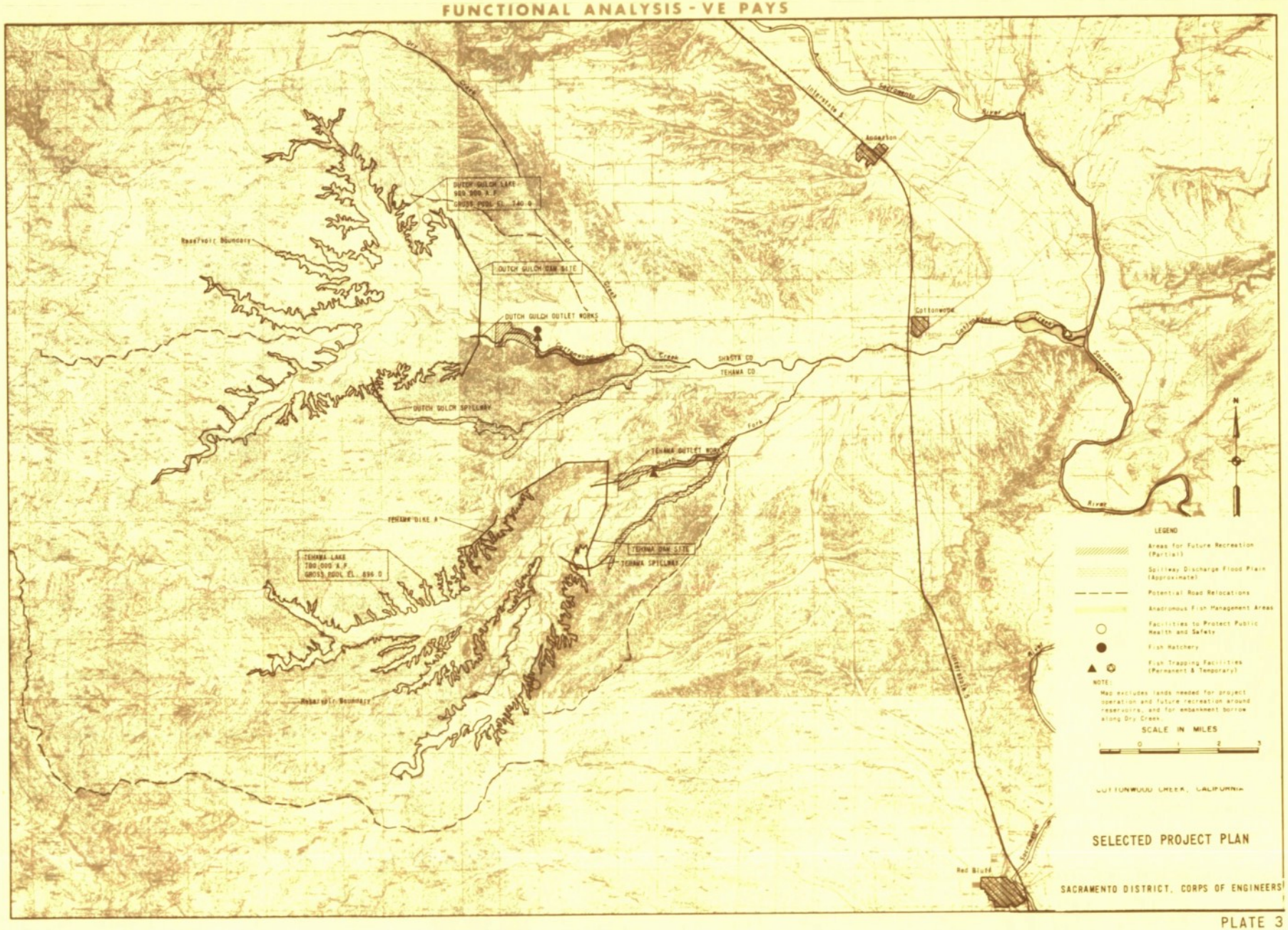


PLATE 3

TO: Defense Technical Information Center
ATTN: DTIC-O
8725 John J. Kingman Road, Suite 0944
Fort Belvoir VA 22060-6218

22 October 2008

FROM: US Army Corps of Engineers
Sacramento District Library
1325 J Street, Suite 820
Sacramento CA 95814-2292

SUBJECT: Submission of technical reports for inclusion in Technical Reports Database

The enclosed documents from USACE Sacramento District are hereby submitted for inclusion in DTIC's technical reports database. The following is a list of documents included in this shipment:

ADB344304 • Lemon Reservoir Florida River, Colorado. Report on reservoir regulation for flood control, July 1974

ADB344333 • Reconnaissance report Sacramento Metropolitan Area, California, February 1989

ADB344346 • New Hogan Dam and Lake, Calaveras River, California. Water Control Manual Appendix III to Master Water Control Manual San Joaquin River Basin, California, July 1983

ADB344307 • Special Flood Hazard Study Nephi, Utah, November 1998 (cataloged)

ADB344344 • Special Study on the Lower American River, California, Prepared for US Bureau of Reclamation – Mid Pacific Region and California Dept. of Water Resources..., March 1987

ADB344313 • Transcript of public meeting Caliente Creek stream group investigation, California, held by, the Kern County Water Agency in Lamont, California, 9 July 1979

ADB344302 • Initial appraisal Sacramento River Flood control project (Glenn-Colusa), California, 10 February 1989

ADB344485 • Report on November-December 1950 floods Sacramento-San Joaquin river basins, California and Truckee, Carson, and Walker rivers, California and Nevada, March 1951

ADB344268 • Reexamination Little Dell Lake, Utah, February 1984

ADB344197 • Special report fish and wildlife plan Sacramento River bank protection project, California, first phase, July 1979

ADB344264 • Programmatic environmental impact statement/environmental impact report Sacramento River flood control system evaluation, phases II-V, May 1992

ADB344201 • Hydrology office report Kern river, California, January 1979

ADB344198 • Kern River – California aqueduct intertie, Kern county, California, environmental statement, February 1974

ADB344213 • Sacramento river Chico Landing to Red Bluff, California, bank protection project, final environmental statement, January 1975

ADB344265 • Cottonwood Creek, California, Information brochure on selected project plan, June 1982

ADB344261 • Sacramento river flood control project Colusa Trough Drainage Canal, California, office report, March 1993

ADB344343 • Detailed project report on Kern River-California aqueduct intertie, Kern County, California. February 1974

ADB344267 • Sacramento River Flood Control Project, California, Right Bank Yolo Bypass and Left Bank Cache Slough near Junction Yolo Bypass and Cache Slough, Levee construction, General Design, Supplement No. 1 to Design Memorandum #13, May 1986

ADB344246 • Redbank and Fancher Creeks, California, General Design Memorandum #1, February 1986

ADB344260 • Cache Creek Basin, California, Feasibility report and environmental statement for water resources development Lake and Yolo counties, California, February 1979

ADB344199 • Sacramento River Deep Water Ship channel, California, Feasibility report and environmental impact statement for navigation and related purposes, July 1980

ADB344263 • Sacramento River flood control project, California, Mid-Valley area, phase III, Design Memorandum, Vol. I or II, June 1986

ADB344262 • Marysville Lake, Yuba River, California, General Design Memorandum Phase I, Plan Formulation, Preliminary Report, Appendixes A-N, Design Memorandum #3, March 1977

The **distribution statement is A** approved for public release; distribution is unlimited.

The Sacramento District source code is **410637**. Please return any materials that aren't appropriate for the technical reports database.

Please acknowledge receipt of shipment by sending email message to Frances.J.Sweeney@usace.army.mil.

Thank you,

Frances J. Sweeney
Library Manager
USACE, Sacramento District Library
916-557-6660